Homework 1

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1.

a. Each row represents an observational unit in the data set, in this case, they represent UK residents.

b. There were 1691 participants in the study—it's the number of rows in the data set.

c. sex: categorical, nominal; age: numerical, continuous; marital: categorical, nominal; grossIncome: categorical, ordinal; smoke: categorical, nominal; amtWeekends: categorical, ordinal; amtWeekdays: categorical, ordinal

2.

a. No, this is an observational study and not an experiment. They did not prescribe treatments to different randomized groups.

b. Maybe drinking more coffee makes people have more cramps. Less sleep could also make people get cramps. These are counfounding variables that might indirectly be the cause of the relationship between stress and muscle cramps.

3.

a. You will get a nice sample from the area, but you might miss out on some areas more than others because of randomness. It could also be more expensive to go to 200 random households across the entire city than just a few neighborhoods.

b. Depending on how you split the neighborhoods, you might over represent certain neighborhoods. Certain neighborhoods might have larger populations, so you'd want to sample more from that area. Of course, this depends on the type of survey being conducted and if different neighborhoods are significantly different in their opinions on the survey.

c. You will miss out on $\frac{17}{20}$ of the neighborhoods, but you will get a good sample from the ones you sample. This strategy could be good if the neighborhoods you sample are representative of the rest of the city.

4.

5.

a. (1) 3, 5, 6, 7, 9

(2) 3, 5, 6, 7, 20

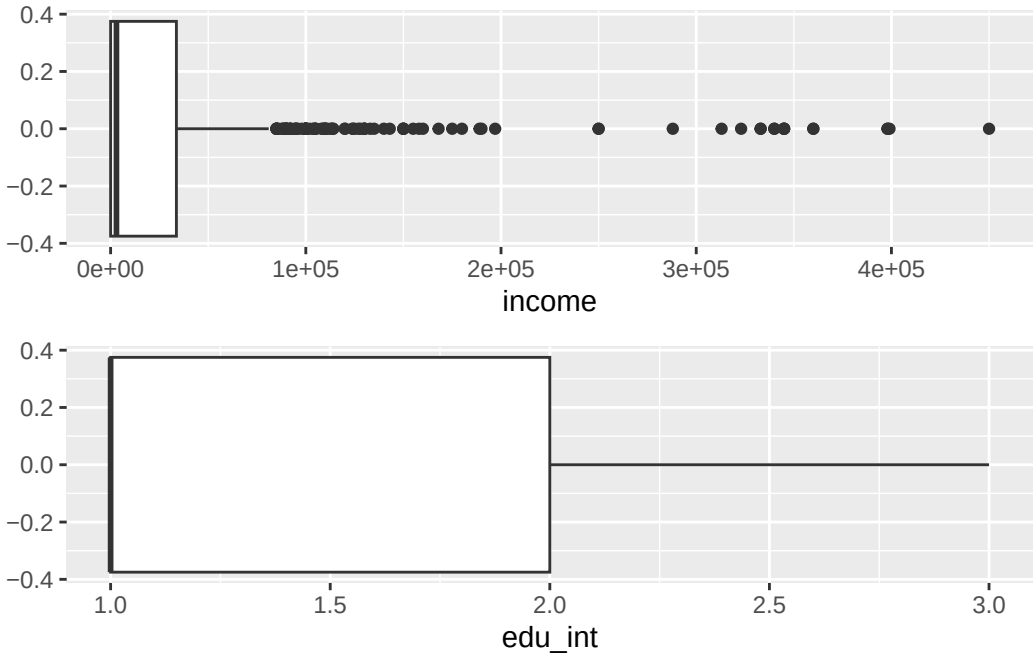
They have the same median and IQR because 20 is the last number in the ordered list. (2) will have a longer right tail (right skewed) because of the 20, in fact it is considered an outlier.

b. (1) 3, 5, 6, 7, 9

(2) 3, 5, 7, 8, 9

9.

```
library(tidyverse)
library(gridExtra)
source("https://www.openintro.org/data/R/acs12.R")

median = median(acs12$income, na.rm = T)
IQR = IQR(acs12$income, na.rm = T)

grad_prop <- table(acs12$edu)["grad"] / length(acs12$edu)

acs12 <- acs12 %>%
  mutate(
    edu_int = as.numeric(edu)
  )

income <- ggplot(acs12) +
  geom_boxplot(aes(income))
edu <- ggplot(acs12) +
  geom_boxplot(aes(edu_int))

grid.arrange(income, edu)
```



Median = 3000

IQR = 3.37×10^4

Grad Proportion = 0.072